so that the mean free path of electrons for up-spin could not be prolonged. As a result, this induces MR ratio depression. This phenomenon is seen when the ultra-thin free layer forms solid solution with the nonmagnetic high-conductivity layer, and becomes more remarkable in thermal treatment. Accordingly, the MR ratio decreases after thermal treatment. To confirm this phenomenon, we, the present inventors made one experiment in which Cu is attached to an Ni alloy layer. In that experiment, less MR ratio depression was seen.

From the experimental results noted above, it is decided that Ni alloys do not form solid solution with Cu. Accordingly, Cu could be in the group of elements not forming solid solution with Ni alloys. For these reasons, in the invention, the group of elements not forming solid solution with Ni alloys shall include Cu in addition to the elements to be derived from the phase diagram. Concretely, the group includes Ru, Ag, Au and Cu. With any of those elements being disposed adjacent to the magnetic layer which does not form solid solution with any of those elements, the compositional steepness in the interface between the magnetic layer and the MR-improving layer is not lost in thermal treatment and good specular reflection could be expected.

The premise in this case is that the magnetic layer is fcc-oriented, which, however, is not imitative. Needless-to-say, the magnetic layer may be non-oriented or may have a

microcrystalline structure, and the MR-improving layer may be applied to the magnetic layer of that type. Concretely, the magnetic layer may be any of amorphous magnetic layers or microcrystalline-structured magnetic layers of CoFeB, CoZrNb or Cr to which may be added any of Ti, Zr, Nb, Hf, Mo, Ta or the like.

In the invention, the MR-improving layer comprising the elements noted above may be partly in the form of a laminate film with any other metal films or of an alloy film with any other elements for the purpose of more ensuring the d-spacing control in the layer and the microcrystalline structure of the layer. The elements constituting the metal films to form the laminate film are desirably fcc metals and hcp metals, including, for example, Al, Ti, Cu, Zr, Ru, Rh, Pd, Ag, Hf, Ir, Pt, Au, etc.

Where the MR-improving layer is of a laminate film, metals of the metal films constituting it and not to be adjacent to the magnetic layer may be capable of forming solid solution with the metals of the other metal films to adjacent to the magnetic layer.

Examples of using a laminate film for the MR-improving layer 4 are mentioned below. Where the magnetic layer 1 is of Co or a Co alloy and the metal film 4a is of Cu not forming solid solution with the element(s) of the layer 1, it is possible that the metal film 4b comprises at least one element

selected from Al, Au, Pt, Rh, Pd and Ir all capable of forming solid solution with Cu. Where the metal film 4a is of Ag, the metal film 4b may comprise at least one selected from Pt, Pd and Au. Where the metal film 4a is of Au, the metal film 4b may comprise at least one selected from Pt, Pd, Ag and Al. Where the magnetic layer 1 is of an Ni alloy and the metal film 4a is of Ru not forming solid solution with the elements of the layer 1, it is possible that the metal film 4b comprises at least one element selected from Rh, Ir and Pt all capable of forming solid solution with Ru. To Ag and Au for the film 4b, the same as above for the metal film 4a of Cu could apply.

Of the combinations noted above, it is desirable that the two elements constituting the MR-improving layer 4 could form solid solution to a level of at least 10 %. For example, preferred are combinations of Au-Cu, Ag-Pt, Au-Pd, Pt-Cu, Au-Ag, etc. Regarding the combination of the metal film 4a and the metal film 4b, however, it is not always necessary that the two can form solid solution in some degree. For example, combinations of Cu-Ru, Cu-Ag and the like are also employable herein. The laminate film for the MR-improving layer 4 is not limited to only the two-layered laminate film composed of the first metal film 4a and the second metal film 4b, but may be composed of three or more layers.

The MR-improving layer 4 is not limited to the laminate film composed of the first metal layer 4a and the second metal